

Forensic Science | 7.3 Tool Mark Identification & Analysis Activity

As you have learned, tool marks are made when two objects come into contact and the harder object leaves a mark on the softer object. You also learned that these marks fall into two distinct categories. These categories are striated marks (also known as abrasive marks) and impressed marks. Remember that striated marks are caused when the harder object is scraped over or rolled around the softer object with a frictional force. Impressed marks are created when an object hits another object with enough force that it leaves an indentation or dent on the surface of the object being struck.

Background Information

There has been a break-in at the local convenience store. Law enforcement officials have called you to the home of the suspected perpetrator of the crime. When you enter the garage, you observe 2 tools that may have been used in the crime, so you decide to collect them and gather some data back in the lab. Later, you will be visiting the hypothetical crime scene to determine if these tools are a positive match with the tool marks left at the scene.

Materials

- Clay - Dark modeling clay works best. Dark colored Play-Doh will work as a substitute. Here is a [simple recipe for Play-Doh](#) that is made from household ingredients. There are many recipes on the internet, so feel free to search for one that you prefer.
- 4 tools (2 pairs of similar tools) **NOTE:** You will want at 2 of the same tools, but with different characteristics. For example, choose 2 flat head screwdrivers in various thicknesses and head widths, 2 hammers that have different shapes and/or sizes and/or 2 similar, but different wrenches, pry bars, etc.
- A friend, classmate, parent, or sibling to make the hypothetical crime scene tool mark.
- Magnifying glass (optional)
- A phone or camera capable of taking a digital photograph of the tool marks you create.



Procedure

For this lab, you are going to create several different tool marks. Once you have created the tool marks you will then change roles and look at the evidence as a forensic scientist. Your focus will then be on examining the tools themselves and comparing them to the marks left behind. For tools #1 and #2, you will make a positive identification and for tool #3, you will rule out a tool. Obviously, since you made the marks yourself, you will know the correct answers, but you should investigate thoroughly so that you can understand the perspective of the crime scene investigator that has no idea if the tool and the tool mark are a match or not. If you have other classmates at your school taking this class, feel free to complete this activity together, with each of you playing the role of the tool mark creator for each other. Just make sure you inform your online instructor.

Data Collection

1. Select one of the tools from the first similar pair to represent the tool found in the suspect's garage.
2. Roll out you clay or Play-Doh.
3. Make an **impression mark** by striking the clay with the tool in a fashion that you can imagine might be used in a break-in crime scene.
4. Make a **striated mark** on the clay by dragging the tool across the clay.
5. Fill in the table below for Tool #1.



Suspect Tool #1 Data Table (2 points)

Type	Tool mark image	Width of mark (mm)	Length of mark (mm)	Describe any special features of mark.
Impression 	<i>Insert close up image of impression tool mark here.</i>	3	11	
Striated 		9	92	

6. Select one of the tools from the second similar pair to represent the tool found in the suspect's garage.
7. Roll out you clay or Play-Doh.
8. Make an impression mark by striking the clay with the tool in a fashion that you can imagine might be used in a break-in crime scene.
9. Make a striated mark on the clay by dragging the tool across the clay.
10. Fill in the table below for Tool #2.

Suspect Tool #2 Data Table (2 points)


Type	Tool mark image	Width of mark (mm)	Length of mark (mm)	Describe any special features of mark.
Impression		15	55	




				
Striated 	<i>Insert close up image of striated tool mark here.</i>	1	60	

The Crime Scene! (6 points)

Have your selected friend, classmate, sibling, or parent use ***one*** of the tools from each of the similar pair to make both impression and striated tool marks without revealing to you which tool they chose. It will be important that they remember which tool they used in each case, but they should make mental note and not mark the tool in any way. They are acting as the hypothetical criminal creating a hypothetical tool mark at the scene of the crime. It will be your job to use the data you collected earlier on the tools from the suspect's garage to determine if the marks are a match those from the crime scene or not.

Before you begin your analysis, please insert images and collect the data regarding the crime scene tool marks in the tables below.

Pair #1 Tool Crime Scene Photos	Width of mark (mm)	Length of mark (mm)	Describe any special features of mark.
<i>Insert close up image of impression tool mark here.</i> 	17	6	
<i>Insert close up image of striated tool mark here.</i>	1	15	

			
Pair #2 Tool Crime Scene Photos	Width of mark (mm)	Length of mark (mm)	Describe any special features of mark.
<i>Insert close up image of impression tool mark here.</i> 	20	20	
<i>Insert close up image of striated tool mark here.</i> 	6	31	

Analysis (1 point each)

1. Did the tool mark from the crime scene match the Suspect's Tool #1? Why or why not?
no, it was too big
2. Describe any special features of the tool mark or data that helped you come to this conclusion?
It was a lot bigger than the first one
3. Did the tool mark from the crime scene match the Suspect's Tool #2? Why or why not?
Yes because it was the same size
4. Describe any special features of the tool mark or data that helped you come to this conclusion?

It was the same size

Conclusion (2 points each)

1. Based on your analysis, is the suspect possibly guilty? Does your hypothetical criminal agree with your analysis? Either way, explain how you came to your conclusion. If you were incorrect, share what details lead you astray.

There is not enough evidence to say that the suspect is guilty. Only one of the tool marks matched the tools found in the garage.

2. Based on the data you collected in this lab, do you feel that tool marks are considered a type of individual evidence, class evidence or both? Explain your reasoning using the information in this lab.

They are both because sometimes the markings are unique enough to only be from one tool but sometimes they can only be narrowed down to one type of tool.

3. Based on your observations and the information presented in this lesson, what are some potential issues that may make tool mark identification less reliable than some other forms of evidence?

The markings could look the same as another of the same type of tool.